

**TABLE 7-1  
MINIMUM LIGHTING REQUIREMENTS**

Facility or function	Illuminance - lx (lm/ft <sup>2</sup> )
Accessways	
- general indoor	55 (5)
- general outdoor	33 (3)
- exitways, walkways, ladders, stairs	110 (10)
Administrative areas (offices, drafting and meeting rooms, etc.)	540 (50)
Chemical laboratories	540 (50)
Construction areas	
- general indoor	55 (5)
- general outdoor	33 (3)
- tunnels and general underground work areas (minimum 110 lux required at tunnel and shaft heading during drilling, mucking, and scaling)	55 (5)
Conveyor routes	110 (10)
Docks and loading platforms	33 (3)
Elevators, freight and passenger	215 (20)
First aid stations and infirmaries	325 (30)
Maintenance/operating areas/shops	
- vehicle maintenance shop	325 (30)
- carpentry shop	110 (10)
- outdoors field maintenance area	55 (5)
- refueling area, outdoors	55 (5)
- shops, fine detail work	540 (50)
- shops, medium detail work	325 (30)
- welding shop	325 (30)
Mechanical/electrical equipment rooms	110 (10)
Parking areas	33 (3)
Toilets, wash, and dressing rooms	110 (10)
Visitor areas	215 (20)
Warehouses and storage rooms/areas	
- indoor stockroom, active/bulk storage	110 (10)
- indoor stockroom, inactive	55 (5)
- indoor rack storage	270 (25)
- outdoor storage	33 (3)
Work areas - general (not listed above)	325 (30)

## SECTION 8

### ACCIDENT PREVENTION SIGNS, TAGS, LABELS, AND SIGNALS AND PIPING SYSTEM IDENTIFICATION

#### 08.A SIGNS, TAGS, LABELS, AND PIPING SYSTEMS

08.A.01 Signs, tags, and labels shall be provided to give adequate warning and caution of hazards and instruction and directions to workers and the public.

08.A.02 Signs, tags, and labels shall be visible at all times when the hazard or problem exists and shall be removed or covered when the hazard or problem no longer exists.

08.A.03 All employees shall be informed as to the meaning of the various signs, tags, and labels used throughout the workplace and what special precautions are required: all employees shall be instructed that danger signs and tags indicate immediate danger and shall be informed of any special precautions that may be required.

08.A.04 The type of sign or tag used in a particular situation shall be appropriate for the degree of hazard or intent of message.

#### > See Table 8-1

a. Signs for contractor operations shall be in accordance with Table 8-1; for USACE operations, design shall be in accordance with Table 8-1 or the USACE Sign manual.

b. Color coding shall be in accordance with Table 8-2.

c. Piping systems shall be identified: it is recommended that the identification of piping systems (including pipes, fittings, valves, and pipe coverings) be in accordance with Table 8-3 and Figure 8-3.

d. The radio frequency radiation hazard warning symbol specified in Figure 8-4 shall be used in the identification of radio frequency radiation hazards.

e. Laser caution and danger signs shall be in accordance with Figure 8-5.

f. Ionizing radiation warning signs, labels, and signals shall contain the symbol show in Figure 8-6.

g. Vehicles or equipment that, by design, move at 1.1 m/s (25 mph) or less on public roads shall display the slow-moving vehicle emblem specified in Figure 8-7.

08.A.05 Each container of hazardous material shall be labeled, tagged, or marked with the identity of the material(s), appropriate hazard warnings, potential health effects, and the name and address of the manufacturer, importer, or other responsible party.  
**> See 06.B.01**

a. Signs, placards, process sheets, batch tickets, operating procedures, or other written means may be used in lieu of affixing labels to stationary process containers if the alternative method identifies the containers to which it is applicable and conveys the information required above. The written information shall be readily available to employees in their work area throughout each work shift.

b. Portable containers into which hazardous material(s) are transferred from labeled containers and which are intended only for the immediate use by the employee who performs the transfer are not required to be labeled; however, there shall be a means of indicating that the hazardous material has been used in the container.

08.A.06 Signs, tags, and labels shall be located as close as safely possible to their respective hazards; tags will be affixed by a positive means (such as wire, string, or adhesive) that prevents their loss or unintentional removal.

08.A.07 Signs, tags, and labels shall be legible and in English; when there are employees who speak a language other than English and to whom the information is to be conveyed, the information may also be presented in their language if it is

presented in English as well. **> See 01.A.04**

08.A.08 Signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections; the ends or heads of bolts or other fastening devices shall be located so that they are not a hazard. Wording shall be easily read, concise, and accurate; the sign should contain sufficient information to be understood.

08.A.09 Construction areas shall be posted with legible traffic signs at points of hazard.

08.A.10 Signs required to be seen at night shall be lighted or reflectorized.

08.A.11 Accident prevention tags shall be used only as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, and lockout. **> See Section 12 for tagout requirements.**

08.A.12 Tags shall contain a signal word (either "danger" or "caution") and a major message (presented in either pictographs, written text, or both) to indicate the specific hazardous condition or the instruction to be communicated to the employee. The signal word shall be readable at a minimum distance of five feet or such greater distance as warranted by the hazard. The signal word and major message shall be understandable to all employees who may be exposed to the hazard. **> See Figure 8-2**

08.A.13 Kerosene lamps and open flame pots shall not be used for or with warning signs or devices.

08.A.14 Warning signs shall be placed on unattended Government-owned floating plant and land based heavy equipment accessible to the public and shall read **DANGER NO TRESPASSING US GOVERNMENT PROPERTY.**

## 08.B SIGNAL SYSTEMS, PERSONNEL, AND PROCEDURES

08.B.01 A standard signal system shall be used on all operations.

- a. Hand signals for crane operations shall conform to those given in Figures 8-8 and 8-9.
- b. Traffic flagging procedures shall be in accordance with the Federal Highway Administration's "*Manual on Uniform Traffic Control Devices for Streets and Highways*."
- c. For Marine signals, see Section 19.

08.B.02 Signal standards shall be posted at the operator's position, signal control points, and other points as necessary to inform those concerned.

08.B.03 Manual (hand) signals may be used when the distance between the operator and signal person is not more than 30 m (100 ft); radio, telephone, or a visual and audible electrically-operated system shall be used when the distance between operator and signal person is more than 30 m (100 ft) or when they cannot see each other.

08.B.04 A signal person shall be provided when the point of operation (includes area of load travel and area immediately surrounding the load placement) is not in full view of the vehicle, machine, or equipment operator; when vehicles are backed more than 30 m (100 ft); when terrain is hazardous; or when two or more vehicles are backing in the same area.

08.B.05 A flag person or other controls shall be provided when operations or equipment on or next to a highway create a traffic hazard; an exception shall be made only when an adequate mechanical signaling or control device is provided for safe direction of the operation.

08.B.06 Where manual (hand) signals are used, only one person shall be designated to give signals to the operator; this signal

person shall be located to see the load and be clearly visible to the operator at all times.

08.B.07 Flag signaling shall be accomplished by use of red flags at least 45 cm (18 in) square or sign paddles; in periods of darkness, red lights shall be used.

08.B.08 An orange or red warning garment shall be worn by flag and signal persons; warning garments worn at night shall be of reflectorized material.

08.B.09 Signal systems shall be protected against unauthorized use, breakage, weather, or interference: any malfunction shall be cause to stop all work.

08.B.10 Only persons who are competent and qualified by experience with the operations being directed shall be used as signal persons.

08.B.11 Signal persons shall back one vehicle at a time; while under control of a signal person, the driver shall not back or maneuver until directed and the driver shall stop when visual contact with the signal person is lost.

08.B.12 The signal person shall have a warning device of clear range and penetrating sound to warn persons when the load is coming in so they have time to get in the clear.

TABLE 8-1

ACCIDENT PREVENTION SIGN REQUIREMENTS

TYPE	PURPOSE	DESIGN
DANGER	Indicates a specific immediate and grave danger, a hazard capable of producing irreversible damage or injury, and prohibitions against harmful activity.	Layout as shown in Fig 8-1. Shall have the word "DANGER" in white within a red oval outlines in white on a black rectangular background in the upper panel and a lower panel for additional wording or symbols in black or red on white for additional wording or symbols in black or red on a white background.
CAUTION	Call attention to a specific potential hazard or a hazard capable of resulting in severe, but not irreversible, injury or damage.	Layout as shown in Fig 8-1. Shall have the word "CAUTION" in yellow on a black background and a lower panel for additional sign wording in black on a yellow background.
GENERAL SAFETY	Includes notices of general practice and rules relating to health, first aid, medical equipment, sanitation, housekeeping, and general safety.	Layout as shown in Fig 8-1 or consisting of a single panel. Shall have the appropriate keyword as the signal word in white on a green background in the upper panel and a lower panel for additional sign wording or symbols in black or green on a white background. Alternatively, the entire sign may be white letters on a green background.
FIRE AND EMERGENCY	Used only to label or point the way to fire extinguishing equipment, fire escapes and exits, gas shutoff valves, sprinkler drains, and emergency procedures.	Layout as shown in Fig 8-1 or consisting of a single red panel. Shall have the appropriate keyword as the signal word in white on a red background in the upper panel and a lower panel for additional sign wording or symbols in red on a white background. Alternatively, the entire sign may be white letters on a red background.
INFORMATION	Provide information of a general nature, such as designation of facilities or services, in order to avoid confusion or misunderstanding.	Layout as shown in Fig 8-1 or consisting of a single panel. Should have the signal word "NOTICE" in white on a blue background in the upper panel and a lower panel for additional wording or symbols in blue or black on a white background. Alternatively, the entire sign may be in white letters on a blue background.
EXIT	Used to indicate exits.	Lettered in legible letters, not less than 15 cm (6 in) high, on a white field. The principal stroke of the letters shall be at least 2 cm (3/4 in) in width.

FIGURE 8-1

ACCIDENT PREVENTION SIGNS

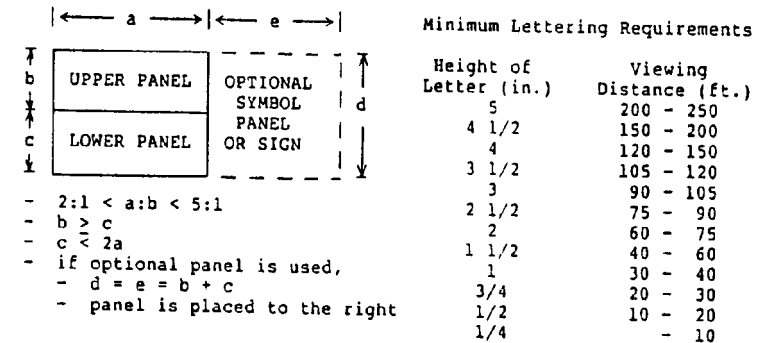
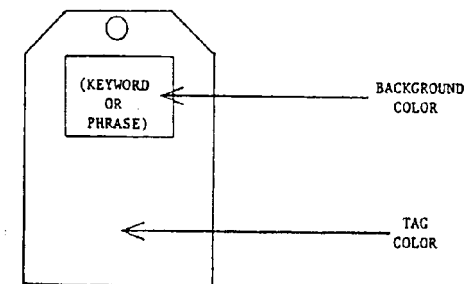


FIGURE 8-2

ACCIDENT PREVENTION TAGS

Keyword/Phrase	Keyword/Phrase Print Color	Background Color	Tag Color
"DANGER"	White in red oval	Black	White
"CAUTION"	Yellow	Black	Yellow
"DO NOT OPERATE"	White	Red	White
"OUT OF ORDER"	White	Black	White
"DO NOT USE"	White	Black	White
Informational message or inspection	Black or green	N/A	Green or white
			White or black



**TABLE 8-2**  
**ACCIDENT PREVENTION COLOR CODING**

COLOR	PURPOSE
Red	Red shall be the color used for identifying dangerous conditions, emergency controls, fire detection equipment and fire suppression systems, and containers of flammable liquids.
Orange	Orange shall be the color used for designating dangerous parts of machines and energized equipment.
Yellow	Yellow shall be the color for designating conditions requiring caution, marking dangerous chemicals, marking physical hazards, and markings for ionizing radiation.
Green	Green shall be the color for designating safety equipment and operator devices and the location of first aid and safety equipment (other than firefighting equipment).
Blue	Blue shall be the color used for designating information of a non-safety nature.
Purple	Purple shall be the color used to designate ionizing radiation hazards.

**TABLE 8-3**  
**IDENTIFICATION OF PIPING SYSTEMS**

Hazard	Field Color	Legend Color
Flammable or explosive material	Yellow	Black
Chemically active or toxic materials	Yellow	Black
Materials of extreme pressure	Yellow	Black
Materials under extreme pressure	Yellow	Black
Radioactive materials	Yellow	Black
Inherently low-hazard+ materials	Green	White
Inherently low-hazards+ gases	Blue	White
Fire quenching materials (e.g., water, foam)	Red	White

FIGURE 8-3  
IDENTIFICATION OF PIPING SYSTEMS

Outside diameter of pipe or covering	Length of color field "A"	Size of letters "B"
3/4 to 1 1/4 inches	8 inches	1/2 inch
1 1/2 to 2 inches	8 inches	3/4 inch
2 1/2 to 6 inches	12 inches	1 1/4 inch
8 to 10 inches	24 inches	2 1/2 inch
over 10 inches	32 inches	3 1/2 inch

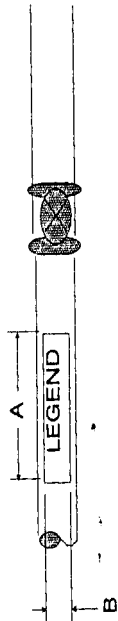


FIGURE 8-4  
RADIO FREQUENCY WARNING SYMBOL



D = scaling unit  
Lettering: ratio of letter height to thickness of letter lines  
upper triangle: 5 to 1 = large  
6 to 1 = medium  
lower triangle: 4 to 1 = small  
6 to 1 = medium  
Symbol is square, triangles are right-angle isosceles

FIGURE 8-5  
RADIOLOGICAL WARNING SYMBOL

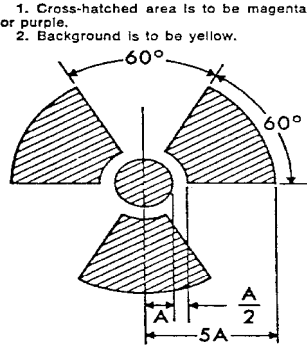
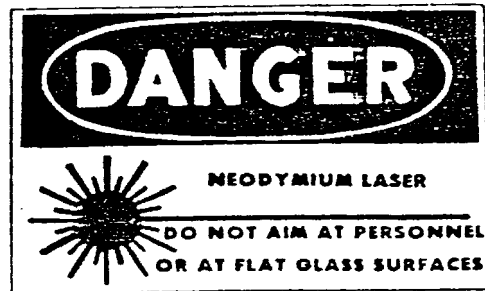
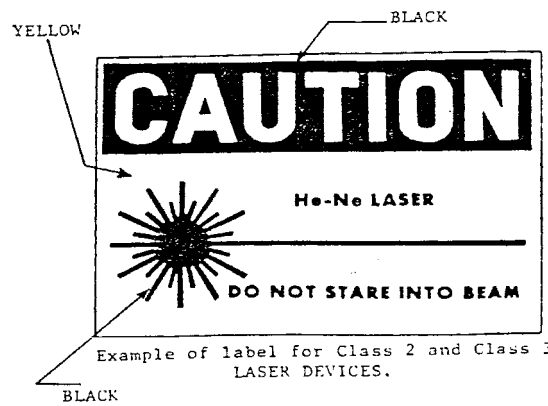


FIGURE 8-6

LASER DANGER AND CAUTION SIGNS



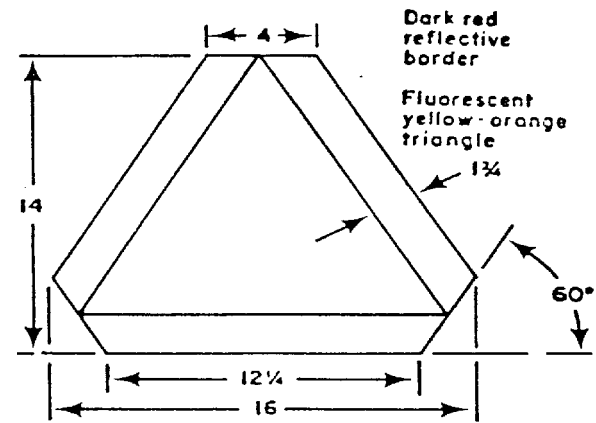
Example of label for Class 3b and Class 4 LASER DEVICES.



Example of label for Class 2 and Class 3a LASER DEVICES.

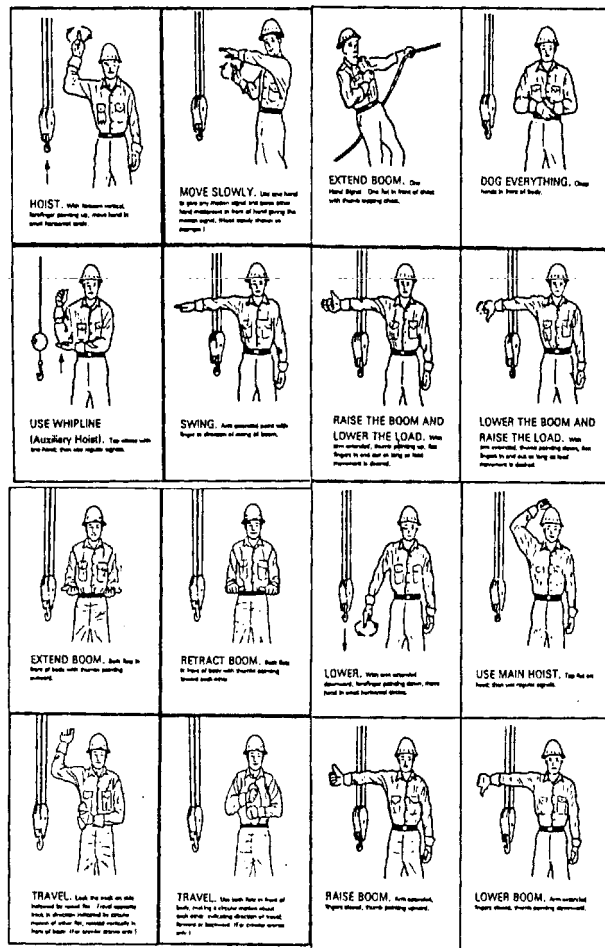
FIGURE 8-7

SLOW MOVING VEHICLE EMBLEM

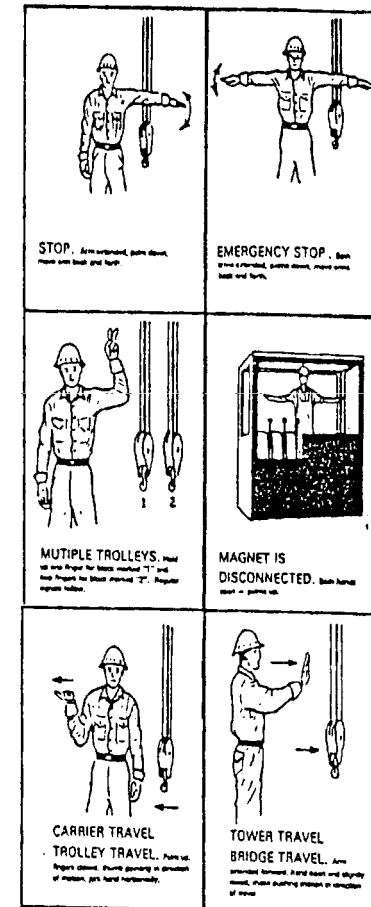


NOTE: All dimensions are in inches.

**FIGURE 8-8**  
**CRANE SIGNALS**



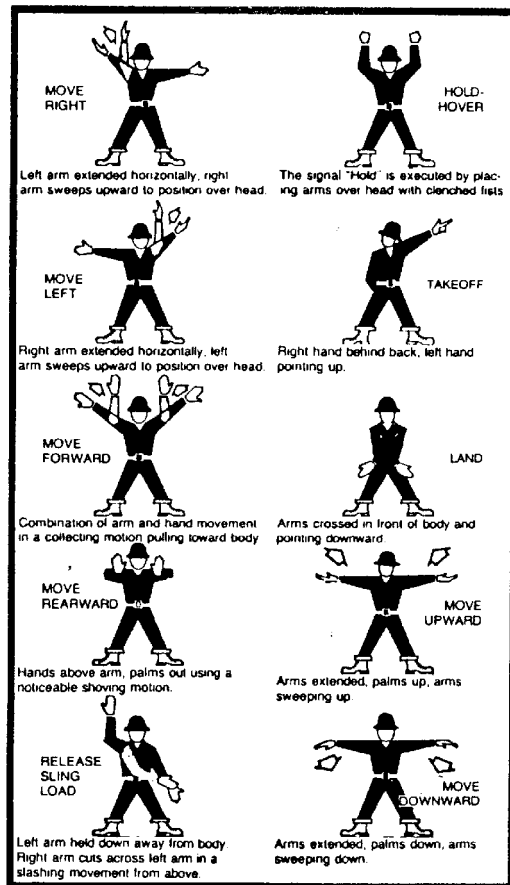
**FIGURE 8-8, continued**  
**CRANE SIGNALS**



NOTE: Crane signals taken from ANSI B30 series standards with permission of The American Society of Mechanical Engineers.



**FIGURE 8-9**  
**HELICOPTER SIGNALS**



**SECTION 9**  
**FIRE PREVENTION AND PROTECTION**

**09.A GENERAL**

09.A.01 An annual survey of the suitability and effectiveness of fire prevention and protection measures and facilities at each project or installation shall be made by a qualified person: records of the survey findings and recommendations shall be retained on file at the project or installation.

09.A.02 When unusual fire hazards exist or fire emergencies develop, additional protection shall be provided as required by the designated authority.

09.A.03 The designated authority shall survey all activities and determine which require a hot work permit.

09.A.04 Fires and open flame devices shall not be left unattended.

09.A.05 All sources of ignition shall be prohibited within 15 m (50 ft) of operations with a potential fire hazard: the area shall be conspicuously and legibly posted **NO SMOKING OR OPEN FLAME**.

09.A.06 Smoking shall be prohibited in all areas where flammable, combustible, or oxidizing materials are stored: **NO SMOKING OR OPEN FLAME** signs will be posted in all prohibited areas.

09.A.07 Areas where there is danger of underground fire shall not be used for the storage of flammable or combustible materials.

09.A.08 Noncompatible materials that may create a fire hazard shall be segregated by a barrier having a fire resistance of at least one hour.